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CONTENTS:

	Page.
Proceedings. January meeting	1
I. Some Contributions to the Study of the New York Water Supply; by A. A. Breneman, S.B.	3
II. On the Estimation of Potash; by Thomas S. Gladding, Ph.D.	12
III. A Platinum Filtering Bulb for Dr. Carmichael's System of Filtration; by P. Casamajor	17
Abstracts from Chemical Journals:	
General and Inorganic Chemistry	18
Organic Chemistry	21
Analytical Chemistry	24
Fats and Allied Substances	25
Abstracts of American Patents relating to Chemistry	29

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The Meeting Room and Library of the Society are at Room 1, University Building, Washington Square, New York.

The Regular Monthly Meeting is held on the first Friday of every month, at 8 P. M.

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W. RUPP, 117 Pearl St., New York.

The Committee on Papers and Publications respectfully call attention to the resolutions of the Society, requiring that papers be submitted to the Committee before being read.

Members who cannot be present at the meetings, are requested to send their papers in care of the Committee, who can guarantee prompt publication of all articles accepted.

Authors will be furnished, gratis, with 20 reprints of each article published in the Journal, if application for the same be made when the article is sent.

Members are requested to notify the Committee of any change of address, or failure in the delivery of the Journal. All communications relating to the Journal should be addressed in care of the Editor

A. A. BRENEMAN, 97 Water St., New York.

PROCEEDINGS OF THE AMERICAN CHEMICAL SOCIETY.

REGULAR MEETING, January 8th, 1886.

Dr. T. Sterry Hunt in the chair.

The minutes of the meeting of December 4th were read and approved.

Mr. Walter B. Price, 26 Broadway, New York, was elected a regular member.

Mr. Wilfrid T. Skaife, Canada Sugar Refinery, Montreal, Canada, was proposed as a member.

The Report of the Committee on Notation and Nomenclature was deferred until the next meeting.

The following papers were read:

Decomposition of Phosphates by Sodium bisulphate (continued), by C W. Volney, Ph. D. Read by title and ordered to be printed.

Estimation of Potash, by T. S. Gladding, Ph. D. Read by title and ordered to be printed.

Composition, and a Natural System of Classification of Native Silicates, by T. Sterry Hunt, Ph. D.

A Platinum Filter for Filtration on Dr. Carmichael's Plan, by P. Casamajor.

Remarks by Messrs. Pool, Rupp, Breneman and the author.

Some contributions to the study of the New York City Water Supply, by A. A. Breneman, S. B.

Messrs. Leeds, Breneman, Endemann, Casamajor and Waldstein were appointed a committee of arrangements for the celebration of the tenth anniversary of the formation of the Society, on April 6, 1886.

The meeting was then adjourned.

C. E. MUNSELL,
Recording Secretary.

TREASURER'S REPORT.

1885.	Dr.		Cr.	
Jan. 1st.	By cash on hand	$138 33	By bills paid	$1,387 58
Dec. 31st.	" receipts	1,752 84	" balance	503 59
		$1,891 17		$1,891 17

DETAILED STATEMENT OF EXPENDITURES.

A. H. Elliot Loan	$25 00
Henry Morton "	50 00
Treasurer's expenses	63 73
Rec. Sec'y's "	44 70
Cor. Sec'y's "	20 50
Librarian's "	56 43
Rent, Janitor, etc	269 25
Insurance	6 00
Journal	844 57
Gas	7 40
	$1,387 58

DETAILED STATEMENT OF RECEIPTS.

Dues collected from members	$1,456 07
Advertisements	198 00
Subscriptions to *Journal*	137 10
Life membership, J. O. Donner, Esq	100 00
	$1,891 17

COMPARISON OF 1884 WITH 1885.

	1884.	1885.
Receipts	$1,494 97	$1,752 84
Expenditures	1,555 55	1,387 58
Deficiency	60 58	
Excess		365 26

Respectfully submitted.

T. O'CONNOR SLOANE,

Treasurer.

SOME CONTRIBUTIONS TO THE STUDY OF THE NEW YORK WATER SUPPLY.

By A. A. Breneman, S.B.

The Croton water system, by which the city of New York is supplied, is well known as an engineering work, but has attracted little attention in proportion to its importance among the sanitary questions which have arisen over the water supply of other large cities.

The Croton water shed occupies a region which was when first chosen, and still is, comparatively free from the dangers of dense population or abundant manufactures, and such changes as may have occurred in the water from the influence of human habitation upon its gathering ground since it was first used in the city have been too minute, or have occurred too slowly to attract public attention. While the quality of this water has never been entirely unobjectionable, it has never been subject to such violent or sudden changes as have caused complaint in other cities. New York, deriving its supply through a subterranean conduit from a remote country district, has obvious advantages over a city which is supplied from an open river receiving sewage and manufacturing refuse from large towns and suburban districts. Nevertheless, there are variations in the quality of Croton water perceptible to the unaided senses which are sufficiently marked and sudden to attract attention with respect to the future character of the water, and to the present character as well, if any scientific standard of purity is to be regarded.

Although much valuable work in the analysis of Croton water has been done in recent years by the City Board of Health, the subject, involving, as it does, the interests of a million and a half of people, is of such importance that it cannot be too closely or minutely examined. The purity of the city water will, doubtless, be controlled in future, as is done elsewhere, by a system of inspection and scientific oversight, in which chemical methods of investigation will play an important part. The nature and sources of all forms of contamination which characterize this water must be minutely studied, and their variations in quantity or quality must be accounted for, and all investigation which contributes to such a knowledge of the water will add to the efficiency of the Croton system.

For these reasons I venture to offer here the results of a series of analyses of Croton water, made during the summer and autumn of 1885, which were intended especially to show the variation in quantity of organic matter from day to day during the season, and the relation of these variations to the conditions of temperature and rainfall.*

Analyses were made of samples taken daily (Sundays excepted), from April 28 to September 10, and weekly thereafter to the end of the year. The samples were taken in the lower part of the city, from a faucet which communicated, through 60 feet of one-inch pipe, with the street main, and the water was in all cases allowed to run for five minutes before collecting the sample. To guard against any possible difference in composition, from sediment in the pipe, duplicate samples were occasionally taken from a street fountain near by, from which the water was constantly running.

The volume of the work, and the pressure of other duties, compelled me to limit the number of determinations as far as possible, and on this account the analyses include only the four factors of free and albuminoid ammonia, chlorine and solid matter. Putting aside the question of the absolute value of the ammonia method, it will be admitted that results obtained by the same method upon a number of samples from the same source, in the hands of the same analyst, and by means of specified procedure in manipulation, will be comparable among themselves, and this was, in the case under consideration, the principal end to be attained. For the rest, the ammonia method offers a better measure of the putrescible or nitrogenous matter in water than any method at present attainable, when rapidity of work is to be considered. The estimations of chlorine and solid residue were added simply for the purpose of studying the influence of the above-mentioned conditions upon these factors.

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* For the records of rainfall and mean daily temperature, I am indebted to the officers of the United States Signal Service Station in New York city.

TABLE I. ANALYSES OF CROTON WATER.

(Parts per 100,000.)

		Ammonia.		Chlorine.	Solid Matter.	Daily Rainfall.	Mean daily Temperature.
		Free.	Albuminoid.				
April 27		.0029	.0210	.343	5.659	.38	57.1
" 28		.0032	.0233	.514	7.546	.92	48.7
" 29		.0031	.0164	.514	8.756	.....	45.6
" 30		.0026	.0212	.514	9.775	.....	58.1
May 1		.0017	.0209	.514	8.232	.65	46.0
" 2		.0016	.0209	.....	8.063	.09	48.4
" 4		.0023	.0205	.514	6.856	.....	47.8
" 5		.0016	.0192	.514	5.652	.....	45.5
" 6		.0037	.0217	.514	5.827	.04	50.1
" 7		.0014	.0195	.514	6.856	.62	48.6
" 8		.0037	.0200	.428	5.142	.23	48.2
" 9		.0043	.0184	.428	7.370	.02	48.2
" 11		†.0035	.0189	.....	.....	.....	49.3
" 11		.0055	.0222	.343	7.370	.....	49.3
" 12		.0045	.0248	.343	8.227	.....	51.3
" 13		.0039	.0240	.343	6.634	.....	51.9
" 13		*.0028	.0179	.343	6.341	.....	51.9
" 14		.0023	.0194	.343	8.227	.02	56.1
" 15		.0025	.0182	.343	8.398	.....	70.6
" 16		.0033	.0172	.343	7.021	.....	63.1
" 18		*.0039	.0176	.343	5.656	.....	60.3
" 19		*.0032	.0185	.343	7.713	.....	69.5
" 20		.0021	.0162	.343	6.170	.....	64.7
" 21		.0022	.0145	.343	8.398	.....	57.0
" 22		.0017	.0224	.343	7.370	.....	56.9
" 23		*.0022	.0127	.343	8.227	.40	58.1
" 25		.0013	.0268	.343	8.227	.....	58.3
" 26		*.0025	.0173	.343	6.341	.....	72.7
" 26		.0043	.0192	.343	6.341	.....	72.7
" 27		.0027	.0238	.343	8.398	.....	70.5
" 28		.0030	.0208	.343	6.634	.....	60.3
" 29		.0037	.0205	.343	7.546	.01	58.1
" 30		*.0032	.0175	.343	5.485	.02	58.6
June 1		.0031	.0186	.343	6.513	.....	68.0
" 2		.0033	.0184	.343	7.892	.....	62.7
" 4		.0029	.0176	.343	6.856	.....	63.7
" 5		.0026	.0190	.343	7.892	.03	65.1
" 6		.0027	.0147	.343	7.713	.....	65.0
" 6		*.0042	.0166	.343	7.198	.....	65.0
" 8		.0038	.0175	.343	6.513	.69	68.0
" 9		.0048	.0204	.343	7.548	.....	59.5
" 10		.0023	.0164	.428	6.174	.....	62.3
" 11		.0025	.0193	.343	7.027	.....	63.4
" 12		.0034	.0216	.428	7.370	.....	65.3
" 13		.0031	.0190	.428	8.398	.....	65.7
" 15		.0038	.0175	.428	8.198	.20	70.6
" 16		‡.0037	.0197	.514	7.198	.02	75.6
" 17		.0044	.0190	.514	5.656	.32	65.6
" 18		.0026	.0177	.427	6.341	.....	68.7
" 19		.0021	.0189	.514	7.027	.....	70.6
" 20		*.0027	.0171	.428	7.546	.....	70.1
" 22		.0026	.0195	.428	6.513	.....	72.3
" 23		.0029	.0221	.343	5.827	.....	63.1
" 25		.0055	.0204	.343	7.546	.....	69.4
" 26		.0050	.0212	.428	6.856	.....	69.2
" 27		.0056	.0166	.343	7.198	28/.58	69.8
" 29		.0037	.0250	.343	7.892	.02	69.3
" 30		.0044	.0213	.428	9.255	.....	64.8
July 1		.0028	.0260	.428	7.370	.....	.....
" 2		.0033	.0266	.428	8.063	.....	.....
" 3		.0026	.0245	.343	8.227	.....	.....
" 3		*.0028	.0233	.428	8.227	5/.16	.....
" 6		.0028	.0208	.343	7.546	.....	71.1
" 7		.0028	.0236	.428	7.546	.61	70.7
" 8		.0066	.0320	.428	7.892	.0	75.9

* From drinking fountain at Wall and South streets.
† " " " " Burl. slip and South street.
‡ " faucet at 18th street and 3d avenue.

TABLE I. ANALYSES OF CROTON WATER.—*Continued.*

(Parts per 100,000.)

			Ammonia.		Chlorine.	Solid Matter.	Daily Rainfall.	Mean daily Temperature.
			Free.	Albuminoid.				
July	9		.0047	.0206	.428	6.634	.96	76.7
"	10		.0056	.0215	.514	6.713	.03	75.5
"	11		.0065	.0243	.428	6.713	.....	74.4
"	13		.0075	.0221	.428	7.713	.....	68.5
"	14		.0089	.0227	.428	7.021	1.06†	68.3
"	15		.0090	.0246	.428	8.741	.....	71.9
"	16		.0074	.0270	.428	8.063	.....	76.8
"	17		.0061	.0227	.343	7.713	.....	81.6
"	18		*.0050	.0208	.343	7.370	.....	83.5
"	20		.0028	.0200	.428	7.892	.....	78.9
"	21		.0015	.0191	.428	7.713	.....	81.5
"	23		.0056	.0178	.428	8.227	.....	77.4
"	24		*.0020	.0214	.428	8.063	.....	76.1
"	25		*.0022	.0240	.514	7.713	26/.18	80.8
"	27		*.0040	.0203	.428	7.546	.....	73.0
"	30		.0034	.0211	.428	7.546	29/.04	75.0
"	31		.0035	.0193	.428	6.856	.....	72.0
Aug.	1		.0042	.0190	.514	6.341	2/2.08	74.9
"	3		.0013	.0191	.343	7.198	2.06	70.1
"	4		.0026	.0222	.....	.....	.24	73.3
"	5		.0027	.0229	.428	6.513	.21	74.0
"	6		.0033	.0248	.428	8.063	.....	69.1
"	10		.0046	.0254	.428	8.063	.....	71.5
"	11		.0051	.0232	.428	7.198	.....	74.1
"	12		.0049	.0202	.514	6.846	.....	76.4
"	13		.0024	.0266	.514	7.599	.70	78.4
"	14		.0042	.0274	.514	7.370	.02	76.7
"	15		*.0038	.0242	.514	6.856	.....	70.9
"	17		.0054	.0249	.599	6.535	.....	70.2
"	18		.0042	.0219	.514	6.341	.....	74.3
"	19		.0028	.0228	.514	8.741	.24	71.8
"	20		.0024	.0284	.599	7.546	.....	70.5
"	21		.0044	.0259	.599	7.546	.....	71.6
"	24		.0041	.0297	.428	7.713	23/.61	76.8
"	25		.0048	.0266	.428	7.021	.....	68.1
"	26		.0040	.0268	.428	8.063	.16	60.4
"	27		.0042	.0336	.343	8.063	.....	58.9
"	28		.0039	.0288	.343	8.063	.....	60.9
"	29		*.0040	.0246	.343	7.892	.....	64.2
"	29		.0030	.0280	.428	8.398	30/.38	67.5
"	31		.0043	.0222	.428	7.370	.....	71.6
Sept.	1		.0041	.0273	.428	7.546	.....	68.9
"	2		.0043	.0277	.428	8.393	.....	60.7
"	3		.0037	.0278	.428	8.570	.....	62.4
"	4		.0050	.0262	.514	8.398	.02	69.7
"	5		.0020	.0290	.514	7.021	.10	65.2
"	7		.0043	.0244	.428	7.021	8/.10	61.8
"	10		.0054	.0332	.428	8.570	.05	59.6
"	16		*.0040	.0284	.342	7.370	9/.14 15/.55	67.6
"	21		.0037	.0259	.342	7.198	.....	60.7
"	26		.0028	.0191	.428	.....	.....	61.9
Oct.	6		.0026	.0197	.514	8.912	14.50	49.6
"	10		*.0022	.0159	.428	7.198	.....	55.8
"	10		.0022	.0138	.514	8.912	.....	.....
"	17		.0029	.0159	.514	7.198	.....	58.1
"	24		.0033	.0184	.600	8.227	.....	52.5
"	31		.0024	.0135	.600	9.426	.....	41.6
Nov.	7		.0029	.0176	.565	8.603	.13	63.7
"	14		.0017	.0152	.514	8.570	8/1.09	45.9
"	21		.0014	.0152	.514	9.426	9/.13	39.8
Dec.	6		.0017	.0146	.514	6.856	5/.13	28.4
"	12		.0022	.0128	.428	7.892	13/1.13	30.8
"	19		.0026	.0142	.428	7.546	14/.25	39.3
"	26		.0044	.0231	.428	7.021	18/.08	24.5

* From drinking fountain at Wall and South streets.
† To 3.00 P. M.

In the distillation for albuminoid aminonia the process was not stopped after the third distillation had been taken off, as Wanklyn directs, but was continued to near dryness leaving only 3–5 c.c. of liquid in the retort. In this way a much better opportunity is given to study the rate at which the albuminoid matter decomposes, each distillate being separately nesslerized. The concentration of the last portions of the reagent and the high boiling point of the liquid are both favorable to the elimination of the maxium of albuminoid nitrogen and the results must approximate the true quantity of nitrogen thus held unless there are subordinate reactions in which nitrogen escapes, a matter which has never, so far as I am aware, been fully determined. That the third distillate is an arbitrary limit is evident when it is considered that different samples of water are known to differ widely in the rate at which they give off ammonia under the action of alkaline permanganate. Even with water from the same source, as in this case, the proportions of the total ammonia obtained after the third distillation differ greatly in successive operations. In twenty-four consecutive analyses of Croton water this proportion averaged about one-fourth of the whole, but there were many wide variations from this mean. *To render the above results comparable, therefore, with those obtained by the ordinary method the figure for albuminoid ammonia should be reduced one-fourth.* On the other hand a direct experiment in which the exhausted retort received a fresh quantity of ammonia-free water showed only traces of ammonia and yielded none after a second renewal of the pure water. This is a point, however, upon which I hope to make further experiments.

In distilling to near dryness there is a very marked increase in the yield of ammonia, as the end is approached. The rate of distillation has an important influence upon the manner in which ammonia is given off, and probably to some extent upon the total quantity, but this source of error is evidently of less importance when the process is carried nearly to dryness. As a rule at least ten minutes were given to each separate distillate.

Free ammonia was taken off in four separate distillates; the fourth distillate rarely showed a perceptible tinge with Nessler reagent.

Chlorine was titrated with neutral chromate in a miniature U. S. gallon (58.3 c.c.), and solid residue was determined by evaporating the same volume in platinum and drying at 100° C.

The results, as shown by the table, indicate, what was, on general grounds, to be expected, viz., a close dependence of organic matter upon rainfall, and an equally marked but more slowly exerted effect of temperature.

The short interval of one to two days between the occurrence of any considerable fall of rain and the rise in the proportion of albuminoid ammonia shows that the passage of water from the gathering ground to the consumer is very rapid, and indicates the need of a better system of storage and settling, so that storm water may be retained long enough to allow the coarser suspended matter to subside. This increase of organic matter is due to loose material torn by the violence of rushing water from the banks of streams and water courses, and to sediment stirred up from shallow pools. The turbidity is largely due to light organic matter, as is shown by the slight influence which it exerts upon the solid residue; any important increase in mineral matter would readily show itself in the weight of dry matter obtained.

The nature of this organic matter requires further investigation. To the eye it seems to be made up of minute, light and floculent particles of a greenish-brown color, almost transparent, and visible only in certain lights. It remains suspended for an indefinite time. Analyses made of the water of August 21, after standing in perfect quiet for three days, showed .0208 and .0198 of albuminoid ammonia in duplicate samples, while the same water shaken up before analysis yielded only .0225. It must be said, in strictness, that this persistent suspended matter belongs rather to late summer, and is less abundant earlier in the season; a sample taken May 25th showed, before settling, .0268 albuminoid ammonia; after settling, .0191. However, it is questionable, whether any process of subsidence alone will be satisfactory as a means of purifying Croton water; filtration, either in the household or on a large scale, is probably the only method by which it can be satisfactorily freed from the suspended matter which is its greatest defect. Along with the abundance of suspended organic matter, there are living bodies of visible size, among which, the familiar crustacean *Cyclops* and minute, brownish worms are most abundant. This abundance of visible, living forms points, unquestionably, to a much greater abundance of microscopic germs and organisms. I expect, during the coming season,

to apply to Croton water the new biological methods for detection of these microscopic forms.

Free ammonia, as shown by the above table, rarely reaches a high figure and is more difficult to connect with rainfall, except in the remarkable increase exhibited from July 7 to 13; otherwise the fluctuations between drought and times of heavy rains do not seem regular or proportionate to the precipitation. The reason of this is, probably, to be found in the rapidity with which ammonia is taken up by water plants and low vegetable organisms.

As to chlorine, the proportion is too low to be of much significance and its minute variations, if they have any meaning, can only be interpreted by a more delicate method of determination than the one employed.

Solid matter is remarkably constant. The water is eminently a "soft" water, and the only effect of rainfall is to lower its proportion slightly, by dilution. The highest proportions are shown during prolonged drought.

WATER SUPPLY OF OTHER AMERICAN CITIES.

In connection with the above work I have made a number of analyses of water taken from other American cities, which are inserted here for comparison.* The samples were obtained through the kindness of many friends, and were all taken from faucets connecting directly with the mains supplying the respective cities, and were collected with the same precautions that have been observed in taking the Croton samples. They were taken principally during the autumn of 1885, and with two exceptions† were, so far as I am aware, perfectly normal samples, that is, they were not taken under any exceptional conditions of rainfall or accidental contamination of the water at the respective sources. In judging of the quality of the different waters as compared with Croton, samples taken at the same time should be compared.

Such comparisons have, of course, a very limited value, since even specimens, taken at the same moment over so wide an area, might be subject to the meteorological conditions, which would considerably alter their character for the time. However, no other mode of comparison is possible, and provided the samples are normal the

* See Table II.

† Philadelphia and San Francisco. See Table II.

relations brought out in this way have a certain value. The results as to albuminoid ammonia have been obtained by the method of distillation heretofore described.

TABLE II. WATER OF AMERICAN CITIES (PARTS PER 100,000).

Date. 1885.	City.	Ammonia.		Chlorine.	Solid Matter.
		Free.	Albuminoid.		
Oct. 25	Pittsburgh, Pa.[1]	.0023	.0204	.771	9.084
" 26	Chicago	.0031	.0123	.600	16.540
" 28	Milwaukee	.0010	.0126	.514	18.168
" 28	Albany, N. Y.	.0029	.0163	.514	10.798
" 29	St. Louis[2]	.0030	.0199	1.456	44.021
Nov. 4	Washington	.0018	.0131	.514	10.289
" 7	New York	.0029	.0176	.565	8.603
Dec. 3	Boston[3]	.0019	.0143	.857	5.827
" 28	San Francisco[4]	.0028	.0162	2.690	23.139
1886					
Jan. 6	Philadelphia[5]	.0103	.0565	.342	22.796
" 7	Brooklyn	.0004	.0083	.942	7.198

1. Quite turbid, with clay and flocculent matter.

2. Very turbid, with fine, reddish clay.

3. Cochituate water.

4. Slightly more turbid than usual, owing to very heavy rain shortly before the sample was taken.

5. Loaded with suspended clay and organic mud from a very heavy flood in the Schuylkill river. This specimen is entirely abnormal, and if taken as representative would do great injustice to Fairmount water.

The above table, representing the composition of the different waters after the close of the warm season, makes probably the most favorable exhibition of each. Exceptional causes of contamination occur in summer, especially in August and September. The accumulated effects of temperature in stimulating all processes of growth and decay and in reducing the volume of water by which debris resulting from these processes is carried off, had reached their limit and subsided greatly, as the larger table shows, before the period at which the samples of the smaller table were taken.

Comparing the figures for albuminoid ammonia among themselves in Table II., the most striking circumstance is the great purity of Brooklyn water as compared with that of other large cities.

Next to this in order of purity stand Chicago and Milwaukee, using the waters of Lake Michigan, although these cannot be regarded as waters of a high degree of purity. The contamination of Chicago water by admixture of sewage from the city, even as far distant as the crib, at which the water of the lake is taken in has been feared, and if this has already occurred, then the water of the lake opposite Milwaukee must be contaminated to an equal degree. The difference in chlorine, a very suggestive factor when sewage is considered, is too small here to be of much significance. The decrease in solid residue in the Chicago water probably indicates dilution with water from sources other than the lake.

The water of St. Louis is loaded with Missouri river mud, and leaves a residue of red clay on evaporation. This water, however uninviting in appearance, is commonly regarded as wholesome for drinking. Judging by the proportion of albuminoid ammonia, however, it is hardly to be commended.

Albany and Pittsburgh are supplied by their adjacent large rivers and can never expect from these sources water of any high degree of purity.

The water of Philadelphia is not to be considered in the list, as the sample, because of the exceptional conditions under which it was collected, is not representative. It is worthy of remark, however, that there is need of great improvement in a water system in which water of this character is permitted to enter into the city supply.

Taking the above list for what it is worth, and arranging the cities in the order of the figures indicating albuminoid ammonia for the purpose of a rough comparison, they would stand as follows:

1. Brooklyn,
2. Chicago,
3. Milwaukee,
4. Washington,
5. Boston,
6. San Francisco,
7. Albany,
8. New York,
9. St. Louis,
10. Pittsburgh.

ON THE ESTIMATION OF POTASH.*

BY THOMAS S. GLADDING, PH. D.

The standard method of estimating potash consists in evaporating the solution, which must contain the potash in the form of chloride, with excess of $PtCl_4$ solution, nearly to dryness, washing the residue with strong alcohol, and weighing as K_2PtCl_6. A strongly advocated modification of the above is the method of Tatlock, the main feature of which is a preliminary washing with 2 or 3 c. c. of a strong platinum solution and final washing with alcohol. This method has the great advantage of estimating potash directly, whether in the form of chloride, sulphate, or nitrate.

In all the published experiments on the standard method we find a tendency to high results. Even when chemically pure KCl and NaCl are used without a mixture of other salts, and when the platinum solution has been refined to the utmost purity, this tendency to excess is recognized. Thus Fresenius, in order to insure removal of all NaCl after washing with alcohol, recommends washing with a few c. c. of water and recovery of any dissolved potash salt from the washings. The committee of the British Association finds that in case the platinum solution is in large excess the results are 5 to 6 per cent. too high, and this even when chemically pure KCl alone is employed. It is manifest that in many cases of commercial analyses where the contents of potash are unknown this large excess and consequent error cannot be avoided.

Again, it has been found that even when the platinum solution gives, in a blank experiment, a residue perfectly soluble in alcohol, it may, from presence of certain impurities, give results far too high when working with chemically pure KCl. When, then, to the above considerations we add the conditions under which the process is used in commercial analysis, especially in fertilizer work, and the difficulty of removing all sulphuric acid, nitric acid, organic matter, lime, salts, etc., and obtaining a solution containing nothing but pure KCl and NaCl, the greater tendency to error is at once evident.

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*Reprinted from the Proceedings of the Association of Official Agricultural Chemists, Sept. 1 and 2, 1885.

On the other hand, the fact that in Tatlock's method the potash can be estimated directly without removal of sulphuric or nitric acids is a strong argument in favor of its use, and were it not for the one objection—that there is a loss varying from 0 to .5 per cent.—we should certainly prefer it to the standard method.

The labor and great care required to make an accurate potash estimation by the standard method in fertilizer analysis has led to an examination of a method proposed by Lindo,* which seems to possess all the advantages of Tatlock's method, and at the same time to be free from a tendency to low results.

Lindo made 10 analyses of a mixture of KCl with 25 per cent. $MgSO_4$ and 10 per cent. NaCl. This mixture was evaporated with excess of platinum solution and the precipitate washed thoroughly with alcohol as usual, until all platinum salts except the potash salt has been removed. A half saturated water solution of NH_4Cl was shaken in a bottle with K_2PtCl_6 till saturated with the latter. This salt is very slightly soluble in the NH_4Cl solution and only a trifling amount is taken up. This solution was used to dissolve out any Na_2SO_4 or sodium chloride from the precipitate. A final washing with alcohol removed all NH_4Cl, and the Gooch crucible contained only pure K_2PtCl_6. His results were as follows:

KCl taken.	Weight of precipitate.	KCl obtained.
0. 46239	1. 5148	100. 11
0. 40915	1. 3404	100. 02
0. 42510	1. 3920	100. 07
0. 41477	1. 3597	100. 18
0. 45149	1. 4797	100. 16
0. 48252	1. 5805	100. 10
0. 44488	1. 4552	99. 96
0. 48679	1. 4244	99. 66
0. 48062	1. 4050	99. 71
0. 41726	1. 3649	99. 96
		99. 99

This proposed method was submitted to the following investigation:

* Chemical News, xliv., p. 130, note.

Chemically pure KCl was obtained by recrystallizing chemically pure $KClO_3$, and fusing to convert it to KCl. 0.25835 grms., of this KCl gave 0.4967 grms. AgCl, equal to 0.25836 grms. KCl. 5 c. c. of the platinum solution employed evaporated to dryness, dissolved perfectly in 90 per cent. alcohol. A solution of KCl in water was now made. By weighing this solution, the KCl employed in all subsequent experiments was very accurately determined. Using KCl alone, Lindo's method gave the following results:

KCl taken.	Weight of precipitate.	KCl obtained.
(1)....0. 24618	0. 80650	100. 11%
(2)....0. 12752	0. 41770	100. 06%
(3)....0. 12395	0. 40550	99. 98%

These analyses show that there is no tendency to loss by this method.

To test the method applied to the estimation of potash in the form of sulphate, chemically pure K_2SO_4 was employed, using an excess of platinum solution and several c. c. of HCl. The results were as follows:

K_2SO_4 taken.	Weight of precipitate.	K_2SO_4 obtained.
(1)....0. 12539	0. 8580	100. 95%
(2)....0. 13228	9. 3790	102. 81%
(3)....0. 49785	1. 4148	101. 45%

These results show that with HCl alone added the ppt is not pure K_2PtCl_6. It may be that the presence of free H_2SO_4 causes the error. To test this an amount of NaCl about equal to the K_2SO_4 was added in the following experiments, thus avoiding presence of free H_2SO_4:

K_2SO_4 taken.	Weight of precipitate.	K_2SO_4 obtained.
(1)....0. 134977	0. 3782	100. 01%
(2)....0. 121427	0. 3415	100. 16%
(3)....0. 122500	0. 3429	99. 95%

The method was now applied to the estimation of potash in superphosphate, using the following mixture: To 60 parts of an acid phosphate were added 10 parts each of the following salts: $NaNO_3$, NaCl, $MgSO_4$ and $(NH_4)_2SO_4$. A blank experiment, using 1 grm. of this mixture, gave 0.08 per cent. potash. This amount was deducted in subsequent experiments.

Experiment 1: 1 grm. +0.07484 grm. KCl, containing 0.0478 grm. K_2O, gave 0.2464 grm. K_2PtCl_6. Taken, 4.78 per cent.; obtained, 4.75 per cent.

Experiment 2: 1 grm. + 0.02748 grm. K_2SO_4, containing 0.01485 grm. K_2O, gave 0.01486 grm. K_2O; taken, 1.485 per cent.; obtained, 1.486 per cent.

A second mixture, which was received from Dr. E. H. Jenkins, and which contained 12.62 per cent. K_2O by composition, gave by this method 12.61 per cent., 12.56 per cent., 12.63 per cent.

These very satisfactory results as regards accuracy, taken in connection with the far easier manipulation, have led to the adoption of the following scheme for the estimation of potash in fertilizers:

(1) *Superphosphates.*—Boil 10 grms. of the fertilizer with 300 c. c. of water for ten minutes. Cool the solution, add ammonia in slight excess, thus precipitating all phosphate of lime, oxide of iron, and alumina, etc., make up to 500 c. c., mix thoroughly, and filter through a dry filter; take 50 c. c., corresponding to 1 grm., evaporate nearly to dryness, add 1 c. c. of dilute H_2SO_4 (1 to 1), and evaporate to dryness and ignite to whiteness. As all the potash is in form of sulphate, no loss need be apprehended by volatilization of potash, and a full red heat must be used until the residue is perfectly white. This residue is dissolved in hot water plus a few drops of HCl; 1 c. c. of a solution of pure NaCl (containing 20 grms. NaCl to the litre) and an excess of platinum solution (2 c. c.) are now added, and the whole evaporated as usual. The precipitate is washed thoroughly with alcohol by decantation and on filter, as usual. The washing should be continued even after the filtrate is colorless. Ten c. c. of the NH_4Cl solution prepared as above are now run through the filter. These 10 c. c. will contain the bulk of the impurities, and are thrown away. A fresh portion of 10 c. c. NH_4Cl is now run through the filter several times (5 or 6). The

filter is then washed thoroughly with chemically pure alcohol, dried, and weighed as usual. The platinum solution used contains 1 grm. metallic platinum in every 10 c. c.

(2) *Muriates of potash.*—In the analysis of these salts an aliquot portion containing 0.500 grm. is evaporated with 10 c. c. platinum solution plus a few drops of HCl, and washed as before.

(3) *Sulphate of potash, kainite, etc.*—In the analysis of these salts an aliquot portion containing 0.500 grm. is taken, 0.250 grm. of NaCl added, plus a few drops of HCl, and the whole evaporated with 15 c. c. platinum solution. In this case special care must be taken, in the washing with alcohol, to remove all the double chloride of platinum and sodium. The washing should be continued for some time after the filtrate is colorless. 25 c. c. of the NH_4Cl solution are employed instead of 10 c. c., and the second 25 c. c. poured through at least six times to remove all sulphates and chlorides. Wash finally with alcohol, dry, and weigh as usual.

A single experiment attempting to estimate potash directly in nitrate of potash did not yield satisfactory results. In such cases it may be necessary to first evaporate to dryness with HCl and then proceed as in analysis of muriates.

To test the solubility of K_2PtCl_6 in the NH_4Cl solution prepared as above, 3.13 grms. of finely pulverized K_2PtCl_6 were digested with 200 c. c. of the NH_4Cl solution and filtered through a Gooch crucible. The loss was found to be 0.0002 grm.

Wherever the standard method of estimating potash is employed, the washing of the precipitate of K_2PtCl_6 with the NH_4Cl solution would undoubtedly be a valuable addition to the present process.

To prepare the washing solution of NH_4CL, place in a bottle 500 c. c. H_2O, 100 grms. NH_4Cl; shake till dissolved. Now pulverize 5 or 10 grms. of K_2PtCl_4, put in the bottle, and shake at intervals for six or eight hours; let settle over night; then filter off liquid into a second bottle. The first bottle is then ready for a preparation of a fresh supply when needed.

A PLATINUM FILTERING BULB FOR DR. CARMICHAEL'S SYSTEM OF FILTRATION.

By P. Casamajor.

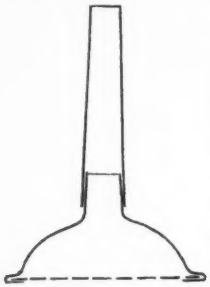
Dr. Carmichael's system of filtration, first published, I believe, in 1870, is well known to all chemists. In this system, filtration takes place on a small paper disc, held by the suction of a filter pump against the flat perforated surface of a small vessel called a filtering bulb. A description of this system of filtration is given in Crooke's *Select Methods of Chemical Analysis*, (London, 1886 p. 665.) Chemists who have seen Dr. Carmichael perforate the flat surface of his filtering bulb by means of a hot wire, say that the operation seems an easy one, but I have learned that very expert glass blowers in New York have failed to make these perforations, so that many chemists, who would have liked to try these filtering bulbs, were not able to obtain them. Several years ago I tried Dr. Carmichael's plan very successfully by making the filtering bulbs in two pieces, one of glass, having the shape of a Plattner's blowpipe mouthpiece, the other being a perforated platinum plate over which was placed a paper disc of slightly larger diameter. The paper disc and perforated plate were held against the glass portion by the suction of a filter pump. This apparatus was described in 1875 (*Chemical News*, **32**, 46), (*American Chemist*, **5**, 440).

In 1881 I published a description of another apparatus for Dr. Carmichael's system of filtration. (*Jour. Am. Chem. Soc.*, **3**, 125.)

Prof. J. P. Cooke, of Harvard, has made Dr. Carmichael's filtering bulb entirely of platinum. (*Proceedings of the American Academy of Science and Art*, **4**, n. s., 125.) This seems the most practical and convenient way of making a filtering bulb; the shape is copied exactly from that of Dr. Carmichael's glass bulb. Only by such skill as a regular manufacturer of platinum ware possesses, can Prof. Cooke's platinum bulb be made. Those he uses were made by Messrs. Johnson & Mathey, of London.

Some time ago I decided to try a Carmichael filtering bulb, made entirely of platinum, and I succeeded in making it in such a way that any moderately skilful metal spinner could construct one.

The figure represents, in section, this filtering bulb which has given entire satisfaction. It is formed in three portions, the upper one being a straight tube which is placed in communication with a filter pump or its equivalent. This tube may be made entirely of platinum, or of platinum foil turned to form a tube, the edges of the foil being soldered with gold.



The portion immediately below this tube has the shape shown in section. No metal spinner of ordinary skill could have any difficulty in turning it on a lathe. The platinum plate should have a thickness of not less than half a millimeter or $\frac{1}{50}$ of an inch. A flat shoulder is turned on the lower part of the bulb. Against this is placed the third portion, a perforated plate, and then the outer rim is turned over the plate so as to leave a circular margin of about 2 or 3 millimeters wide. The platinum bulb has a short tube, spun on the lathe, which is made conical so as to fit tightly into the tube which connects it with the aspirator. The bulb and tube may be soldered together with gold, if it is thought preferable, instead of being connected by the conical tube of the bulb fitting tightly into the longer tube.

The platinum filtering bulb, which I am now using, was made by Messrs. Eimer & Amend, Third avenue and 18th street, New York.

ABSTRACTS.

GENERAL AND INORGANIC CHEMISTRY.

Fixations of Free Atmospheric Nitrogen by Argillaceous Soils. BERTHELOT.

The author discusses the questions of nitrification by atmospheric nitrogen, and the formation of nitric acid and of ammonium nitrate by the electric spark. He believes, with Boussingault, that plants cannot assimilate atmospheric nitrogen directly. Ten years ago the author established the theory of a new cause of fixa-

tion of nitrogen; atmospheric electricity acting, not by strong discharges and forming nitrates and nitrites, but slowly, forming complex nitrogenous compounds in a continuous way by the feeble electric tension always and everywhere existing on the surface of earth.

These researches have led to the discovery of another cause of fixation of atmospheric nitrogen, namely, the action of the argillaceous soils and the micro-organisms in them. The soils experimented upon, sands and kaolins, slowly fix free atmospheric nitrogen. This action is independent of nitrification, or the condensation of ammonia, and is due to the presence of living organisms. It does not manifest itself in winter, but occurs especially during the season of vegetation. A temperature of 100° annihilates it; it exists as well in inclosed spaces as in the open air, and in darkness as well as in light, although less active in the former case. Analytical results were obtained during one season from four kinds of soils: sand, yellow sand, kaolin, and argillaceous kaolin. These experiments show how argillaceous sands, at first almost sterile, can increase in fertility year by year through the nitrogen thus fixed, and through that of previous vegetation. (*Bul. Soc. Chim.*, **45**, *121.*) M. L.

Electrolysis of few Chemical Compounds. D. Tommasi.

Potassium Chlorate. A very dilute solution of potassium chlorate, very slightly acidulated with sulphuric acid, is decomposed by 8 Bunsen elements; the cathode was platinum, the anode pure distilled zinc. After two hours chlorine could be detected with the silver nitrate. The electrolysis gave

$$KClO_3 + 3Zn + 3H_2SO_4 = KCl + 3ZnSO_4 + 3H_2O.$$

If the zinc anode is replaced by platinum, no chlorine can be detected, even after 5 hours. It is only after great dilution of the chlorate that an alkaline reaction can be found in the limb of the V tube containing the cathode.

Potassium Perchlorate. Even 12 Bunsen elements fail to decompose this salt with an anode of zinc foil, and in presence of free H_2SO_4. In absence of acid, gas appeared at the end of the electrode; perchloric acid appears at the anode, and potassium oxide at the cathode.

Chloral Hydrate. A porous dish contains a solution of this salt; an outside dish contains dilute H_2SO_4; the anode dips into the acid. The chloral solution showed presence of aldelyde after electrolysis. (*Bul. Soc. Chim.*, **45**, *144.*) M. L.

Contributions to a Knowledge of Sulphur and Mercury. BERTHELOT.

In the drying rooms of powder mills, where gun powder is dried at a temperature between 60° and 65° C, the warm powder has an odor very like SO_2. A sublimate collected on panes of glass placed above the desiccating tables was found to contain

Sulphur	97.84
Potassium nitrate	0.90
Traces of carbon and other bodies undetermined	1.26

It is, in fact, pure sulphur. The tension of sulphur vapor is not measurable; it must be *nil* at the ordinary temperature. Sublimated sulphur was never found above the samples in collections. Similar facts exist for mercury, the tension of which at 20° is 0° .0268m. The author describes a room where there is a large mercury bath. In a closet at a height of 6 feet, and 8 feet distant from the mercury, a glass stoppered flask containing iodine showed, after four years, a deposit of mercury iodide around the junction of the stopper and the flask. (*Bul. Soc. Chim.*, **45**, *114.*) M. L.

Combination of Auric Chloride with Sulphur Tetrachloride and Selenium Tetrachloride. L. LINDET.

Sesquichloride of gold and sulphur, $Au_2Cl_3S_2Cl_4$—Forms fine golden needles, often grouped together. It is obtained by the action of dry chlorine on sulphur protochloride in presence of gold.

The analysis of this compound is made by treating it in a slightly alkaline solution with potassium permanganate in excess; the excess is afterwards destroyed by alcohol. The precipitate contains all of the gold; the clear solution contains the chlorine and the sulphur as sulphuric acid. The analysis gave

	Found.	Calculated.
Gold	41.1	41.27
Chlorine	51.6	52.04
Sulphur	7.1	6.70

The compound is easily dissociated, losing chlorine in dry air, or in vacuo, and being decomposed by water.

Perchloride of gold and selenium. $Au_2Cl_3Se_2Cl_4$.—The tetrachloride of selenium being solid and infusible is dissolved in arsenious chloride and put then in contact with the gold at 130° in presence of dry chlorine. The salt occurs in fine tables of a reddish orange color. Water decomposes it into gold chloride, HCl and selenious acid. (*Bul. Soc. Chim.*, **45**, *146.*) M. L.

Researches on Vegetation.—On Carbonates in Living Plants. BERTHELOT and ANDRÉ.

The authors have been led to the investigation of the simplest organic salts existing among the immediate principles of plants, the carbonates. Free carbonic acid is eliminated by keeping in vacuo and afterwards boiling. These operations must be performed immediately, to avoid fermentation. HCl is added, the temperature being kept near ebullition, and a stream of purified air is made to pass into the liquid. The carbonic acid is collected in an absorption apparatus. In a plant weighing 16.9252 grms. they found 0.40 grms. of CO_2, after ebullition 0.175 grms.; the roots, leaves and flowers contained chiefly free CO_2, whereas in the stem the free CO_2 before ebullition was about double the combined acid. If the plant is kept under water a few days the amount of CO_2 increases rapidly, as in the doubling of ethylcarbonic and orsellic acids. Some considerations on problems of vegetable physiology follow the analytical results. (*Bul. Soc. Chim.*, **45**, *116.*) M. L.

Continuous Preparation of Oxygen. A. BIDET.

The author indicates the employment of the reaction of chloride of lime on the oxide of cobalt, a reaction given by Rosenstiehl for preparation of oxygen. The device cannot be explained without the diagram. (*Bul. Soc. Chim.*, **45**, *81.*) M. L.

ORGANIC CHEMISTRY.

On Isomerism in the Aromatic Series.—Heat of Neutralization of Oxybenzoic Acids. BERTHELOT AND WERNER.

The study of the isomeric polyatomic phenols led the authors to determine the constitutional difference by measuring the heat of

neutralization. The bodies of the orthobenzene series are very clearly distinguishable from the derivatives of the meta and parabenzene series. These two latter classes exhibit towards alkalies two phenolic functions, whereas the orthobenzene derivatives manifest only one. Similar results are given by the three isomeric oxybenzoic acids ; for the three the heat yielded with the first equivalent of alkali is about the same ; the heat of solution also is almost equal. The difference is apparent, however, in the addition of a second equivalent of alkali ; here the heat for the para and metaoxybenzoic acids amounts about to the same figure, whereas, it is almost nothing for salicylic or orthobenzoïc acid. The similarity of these results to those obtained with the three oxyphenols (considered as generators of the oxybenzoic acids) shows the thermochemical diversity of the aromatic isomers. (*Bul. Soc. Chim.*, **45**, *63.*) M. L.

On the Oxybenzoic Acids and the Heat of Formation and Transformation. M. M. Berthelot and Werner.

The authors have studied the action of bromine on the three isomeric oxybenzoic acids ; this action gives the same final products for two of the acids : carbonic acid and tribromphenol. The final products thus being the same it is easy to calculate the reciprocal heat of transformation of the two isomers. The heat of formation of tribromphenol, starting from phenol, has been established by former experiments, and thus the heat of formation, starting from their elements, of two of the three oxybenzoic acids is easily calculated. The authors conclude, that the reciprocal transformation of isomers of the same chemical function produces only small thermic effects, and consequently answers to a very small amount of energy when compared to the work developed by proper combinations, polymerisations and by the true changes of function. (*Bul. Soc. Chim.*, **45**, *63.*) M. L.

On the Action of Diazo-Compounds on β-Naphthylamine. J. A. Lawson.

From experiments made, the author comes to the conclusion that the compounds produced by the action of diazo-salts on β-naphthylamine, are most probably diazoamido-compounds. Their behavior on boiling with acids warrants this supposition. Benzol-

diazo-β-naphthylamine, $C_{10}H_7NHN{=}N{-}C_6H_5$ crystallizes from absolute alcohol, in bright red, rhombic scales, and from dilute alcohol in long, light red needles, but is insoluble in water; melting point 102–104. From this the acetyl and benzoyl-compounds were obtained. On reduction, the above yielded an a-β-naphthylendiamine, from which the chloride, sulphate, acetyl and benzoyl-compounds were produced. (*Ber. d. chem. Gesell., 1885, 796.*)

J. H. S., Jr.

On the Action of Amines on Chinone. Th. Timcke.

From benzochinon the authors succeded in preparing dianilidobenzochinon, and dianilodobenzochinon anilid. The latter is represented by the formula $C_6H_2\begin{cases}O\\N{-}C_6H_5\\NH{-}C_6H_5\\NH{-}C_6H_5\end{cases}$ It is prepared by dissolving benzochinon in 20 times its weight of hot glacial acetic acid, and adding to the solution so obtained, for every 1 pt. of benzochinon, 2 pts. of aniline. It is heated on the water bath for a short time, and then filtered rapidily. On cooling, the anilido-compound crystallizes out, and may be purified by recrystallizing from alcohol. Brownish-red needles, melting at 202–203°C. and soluble in strong H_2SO_4, with a blood-red color. From the above were also obtained anilidooxybenzochinonanilide,

$$C_6H_5\begin{cases}O\\NH{-}C_6H_5\\NH{-}C_6H_5\\OH\end{cases}$$

, and anilido-oxybenzochinon $\begin{cases}O\\O\\NH{-}C_6H_5\\OH\end{cases}$

(*Ber. d. chem. Gesell., 1885, 758.*) J. H S., Jr.

On the Nature and Properties of Alkaloids. Oechsner de Coninck.

The author thinks that the definitions generally given of an alkaloid are too vague; it is said that

"Alkaloids are compounds of nitrogen, capable of uniting with acids, like ammonia, and forming with them definite combinations, which are true salts." The inconvenience of this definition is that it can be applied in general not only to the true alkaloids that constitute a separate group among these compounds of N, but to all

basic compounds of N. The amido-compounds combine also with acids, but they have never been considered as alkaloids.

As a means of classification the author advocates the reaction of Anderson (action of warm water on the chloroplatinates and chloraurates of these bases). He proposes to base the definition of an alkaloid upon the resistance of these double salts to oxidizing influences, and to the decomposing action of water. Alkaloids may be divided in three groups, viz.: 1. Alkaloids, the chloroplatinates and chloraurates of which lose HCl by contact with boiling water. 2. Alkaloids, the double salts of which resist the action of boiling water. 3. Alkaloids, the double salts of which are decomposed by boiling water. The volatile alkaloids are pyridic or dipyridic hydrides.

The compounds called fixed alkaloids are bodies with a double nucleus, whether hydropyridic or hydrodiquinoleic, or with a mixed hydropyridic and hydroquinoleic nucleus in which hydrogen is replaced by one or more oxygenized radicals, and containing hydroxyl of phenolic or alcoholic function. He thinks that the future definition of an alkaloid will be: A compound of nitrogen which oxidizing bodies convert into pyridine or quinoline carboacids, or into a mixture of one of these acids with a fatty or an aromatic acid. (*Bul. Soc. Chim.*, **46**, *131.*) M. L.

ANALYTICAL CHEMISTRY.

Detection of Acetone in Liquids, Especially in Pathological Cases. P. CHAUTARD.

Acetone appears in the last stage of diabetes called acetonemia. The best way of detecting it is by distillation, but this operation is difficult, and the quantity of urine emitted is usually very small. In 1860, Dr. Gerhardt proposed the detection of acetone by adding a few drops of sulphuric acid to the liquid; this process is worthless. The author proposes to use as a means of detection the violet coloration given to salts of rosaniline by aldehyde and by acetone. He prepares a solution of 0.25 grammes of fuchsine in 500 c. c. of water and treats with SO_2 (gas); the liquid then becomes colorless. To detect acetone in a urine, 15–20 c. c. of it

are taken, and not more than 1 c. c. of the decolorized fuchsine are added; the appearance of a coloration shows the presence of acetone. When the amount of acetone is very small 200 c. c. of urine are distilled slowly and the first 15 c. c. are tested as above; by this process $\frac{1}{10000}$ of acetone can be detected. (*Bul. Soc. Chim.*, **45**, *83*.).

M. L.

A New Method for the Estimation of Nitrogen. C. Arnold.

The process consists in heating the substance in a combustion tube of Bohemian glass, with a mixture of equal parts of soda-lime, sodium hyposulphite, and sodium formate. Very accurate results are claimed (*Ber. d. chem. Gesell., 1885, 806.*)

J. H. S., Jr.

ABSTRACTS.

RELATING TO FATS and ALLIED SUBSTANCES.

By R. W. Moore.

On the Decomposition by Heat of Acids of the Fatty Series. M. Hanriot.

The author remarks that the laws that govern the decomposition by heat of the polyatomic acids of the fatty series are imperfectly known, these acids giving rise to a large number of compounds, notably acetones which cannot be explained by any simple relation. The experiments were made in the presence of an excess of slaked lime as the decomposition was simpler under this condition. The results were as follows:

Succinic acid ($C_4H_6O_4$).

Calcium succinate yields a very small amount of liquid products, but much gas, which was found to be ethane. ($C_4H_6O_4 = 2CO_2 + C_2H_6$.)

Adipic acid ($C_6H_{10}O_4$).

Obtained by action of nitric acid on stearic acid, melted at 131°. On heating with lime a gas was given off, probably butane. ($C_6H_{10}O_4 = 2CO_2 + C_4H_{10}$).

Glycolic acid $C_2H_4O_3$.

Calcium glycolate is only decomposed at a nearly red heat. A small amount of liquid products were found in which methyl alcohol could not be recognized. The gases consist of two volumes of methane and one volume hydrogen.

Lactic acid $C_3H_6O_3$ is decomposed as follows, furnishing alcohol: $C_3H_6O_3 = CO_2 + C_2H_6O$.

Calcium lactate was dissolved in warm water, the solution distilled to drive off any alcohol present, and then mixed with twice its weight of slaked lime. It was then distilled, and the distillate was rectified. The portions passing over between 50° and 90° were dried over quick lime, treated with iodine and phosphorus and the resulting ethyl iodide was washed with water to remove acetones, dried and rectified. Another portion treated with benzoyl chloride yielded ethyl benzoate.

The yield of alcohol is greater, the larger the quantity of lime used. The above proportions gave 25% of the theoretical yield.

This formation of alcohol is of interest since alcohol can thus be obtained from glucose without fermentation.

Pyruvic acid $C_3H_4O_3$.

This acid with excess of slaked lime gave a very small quantity of aldehyde, recognized by the formation of ammonium aldehyde. The small amount is explained by the destructive influence of the excess of lime on the aldehyde formed.

Of the five acids which were made the subject of experiment, four split up in a very simple manner, losing CO_2. Glycolic acid, which is the only exception, suffers a profound decomposition due to the high temperature of the reaction. (*Bul. Soc. Chim.*, **45**, *78.*) R. W. M.

On the Preparation of Axle Grease. A. Ihl.

To prepare English axle grease rosin oil is boiled with what is termed the "addition." To prepare this, rosin oil is boiled with slaked lime for eight or twelve hours till an homogeneous chocolate-colored mass is obtained which can transform twelve times its weight of rosin oil into pasty axle grease. Ihl finds that by adding powdered slaked lime to the original rosin oil that the same results are obtained, which dispenses with a troublesome operation.

H. Kratzer gives the following directions for preparing axle grease: Ten kilos of lime are dissolved in 3.2 kilos of water, 12.5 kilos rosin oil are then warmed in an iron kettle until vapors cease to be given off, when the dissolved lime is then added at a gentle heat. The whole is then carefully stirred until free from lumps and until it drops with difficulty from a wooden rod.

Thus is obtained the so-called "mother grease" from which the various axle greases are prepared. Thus 30 kilos of rosin oil are mixed with 5 kilos "mother grease" to form "blue axle grease," which is generally called "Belgian axle grease." For this there is an extensive demand at a low price, on which account the bad custom is prevalent of "filling" it, that is, adding 20–50% of talc. By coloring with an alkaline solution of turmeric the so-called yellow axle grease is obtained. Paraffin oil and tar oil can be treated in the same way. (*Ding. Pol. Jour.*, **259**, *103.*)

R. W. M.

The Determination of Glycerine. W. Fox and J. A. Wanklyn.

The method given is based upon the fact that glycerine oxidized with potassium permanganate in an alkaline solution gives oxalic acid according the equation.

$$C_3H_8O_3 = C_2H_2O_4 + CO_2 + 3H_2O.$$

The oxalate is precipitated as a calcium salt, and oxalic acid and glycerine are calculated. The process is conducted as follows: Not more than 25 grms. glycerine is made alkaline with 5 grms. solid KOH. Powdered permanganate is added until a pink color is obtained. The solution is boiled for 30 minutes and the excess of permanganate decomposed with SO_2. Filter, treat colorless filtrate with acetic acid and boil; add calcium salt and collect precipitate on a filter and wash with boiling water. The oxalic acid is titrated in the usual way with permanganate. The difference in several experiments should be under 0.5%. The authors also call attention to the fact that in saponification of fats all of the alcohol used should be driven off, since it yields oxalic acid with permanganate. Acids of the acetic series do not oxidize to oxalic acid with alkaline permanganate while those of the acrylic series do. (*Chem. News*, **52**, *337.*)

R. W. M.

Adulteration of Linseed Oil with Rosin Oil, etc. H. STOCKMEIER.

The adulteration of linseed oil with other cheap fatty oils is precluded by the relations in price. On the other hand an adulteration with rosin oil has been repeatedly observed, and such adulteration with Scotch mineral oils is probable. India has recently begun to export flaxseed, which is worked up in England and Holland principally for the oil cake, the oil being the by-product. This oil, which cannot be distinguished from that obtained entirely from the *Linum usitatissimum*, has the property of not drying even after boiling with lead oxide, or of gradually becoming thick, under other conditions. This linseed oil has frequently come into trade as a sophistication and has there excited the greatest distrust and suspicion. (*Ding. Pol. Jour.*, **259**, *103, from Tech. Mitth. für Malerei, 1885, 58.*) R. W. M.

On the Determination of Fat in Palm Nut Meal. WILM.

Five grms. of the previously dried and finely powdered substance are brought into a Soxhlet extraction apparatus in a cylinder made of filter paper. The water bath is heated to 65° so that the ether is driven from the flask in about four minutes. The extraction when conducted in this manner can be completed in two hours. (*Ding. Pol. Jour.*, **259**, *103; from Landw. Versuchsst, 1885*, **32**, *1.*) R. W. M.

On the Methods of Butter Analysis.

An abstract of Prof. H. B. Cornwall's report to the New Jersey State Board of Health, 1884. (*Chem. News*, **53**, *19.*) R. W. M.

Average Composition of Milk.

P. Vieth gives the results of the analysis of the milk of a herd of three hundred short horn cows made regularly for some years. The yearly means are respectively 13.0%, 13.1% and 13.0% for total solids. Cows of the Jersey, Guernsey and Ayrshire breeds give higher means and higher maxima. (*Bied. Centralbl.*, **14**, *19.*) R. W. M.

The Oxidation of Sebacic Acid. H. CARETTE.

This process yields succinic and adipic acids and normal propylene dicarbonic acid. (*Chem. News*, **53**, *35.*) R. W. M.

Abstracts of American Patents Relating to Chemistry.

(From the Official Gazette of the U. S. Patent Office.)

December 29th, 1885.

333,149.—Dynamite. R. S. Penniman and J. C Schrader.

Consists of finely comminuted solid matter, charged with nitroglycerin, and grains of ammonium nitrate, which are enclosed with a soft or viscous envelope or coating for which nitroglycerin has no affinity.

333,150.—Dynamite. R. S. Penniman and J. C. Schrader.

333,151.—Gelatinated Explosives. R. S. Penniman and J. C. Schrader.

Consists of gelatinated nitroglycerin and protected ammonium nitrate.

333,152.—Explosive Compound. R. S. Penniman.

Consists of grains of ammonium nitrate, coated or protected against deliquescence, and potassium chlorate rendered incapable of caking in mass by means of a dry powdered material, such as magnesium carbonate.

333,169.—Mixed Paint. J. Stackhouse.

A mixture of fresh air slaked lime, coal tar, Prince's metallic coal oil, brown japan, baking soda, water, benzine and shellac.

333,344.—Explosive Compound. J. C. Schrader.

333,345.—Process of Making Explosive Compounds. J. C. Schrader.

333,346.—Dynamite. J. C. Schrader.

333,347.—Dynamite. J. C. Schrader.

333,348.—Dynamite and Process of Making the Same. J. C. Schrader.

(January 5th, 1886.)

333,508.—Carburetor. A. J. English.

333,649.—Manufacture of derivatives of aurin. C. Lowe.

The coloring matter, named by the inventor "rosophenoline sulphonic acid," is obtained by first heating 1 part aurin with 5 parts sulphuric acid to 38-100°, separating the excess of acid in the usual manner, and then heating the product with aqueous or alcoholic ammonia, until the coloring matter is produced.

333,652.—Transforming soft sugar into hard block sugar. F. O. Matthiessen.

333,673.—Apparatus for distilling wood, etc. J. Roberts.

333,680.—Manufacture of sizing compounds for papermaker's use. C. Semper.

A neutral solution of aluminium sulphate is freed from iron by the addition of lead dioxide. It is then made basic by the addition of zinc oxide, after which sodium bicarbonate is added. The concentrated and solidified product forms a porous mass.

333,691.—Apparatus for manufacturing gas. J. L. Stewart.

333,692.—Process of manufacturing gas. J. L. Stewart.

333,693.—Apparatus for manufacturing gas. J. L. Stewart.

333,721.—Process of filtering alcohol. J. Bendix.

333,750.—Apparatus for distilling wood. L. Hansen and A. Smith.

333,786.—Solder for aluminium. J. S. Selon.

An alloy of zinc, tin and lead.

333,801.—Artificial lithographic stone. J. Wezel.

Consists of a metal plate coated with a mixture of a lime salt of a fatty or resinous acid, and calcium sulphate.

333,815.—Process of obtaining gold, silver, copper, nickel and cobalt from their ores by electrobysis. M. Body.

The roasted or oxidized ores are subjected to the action of a solution of a ferric salt, an electric current being passed through the solution at the same time. The metal is dissolved and precipitated, chlorine is generated at the positive pole, and the ferrous salt is reconverted into ferric.

333,859.—Process of and apparatus for producing gas. E. J. Jerzmanowsky.

Gas is continuously produced by passing steam and hydrocarbon through a body of lime, maintained in a heated condition.

333,860.—Process of producing gas. E. J. Jerzmanowski.

Water gas is made by injecting steam through an incandescent body of carbon, then adding to the gas steam and hydrocarbon, and passing the mixture through heated lime.

333,861.—Manufacture of soluble methyl blue from rosaniline. A. Kern.

Is prepared by sulphonizing trimethyltriphenylrosaniline.

333,872.—Explosive compound. M. F. Lindsley.

Consists of nitro-cellulose, sodium nitrate, charcoal, potassium chlorate, starch and potassium carbonate.

333,875.—Process of bleaching. W. Mather.

The cotton yarns and fabrics are first treated with a boiling solution of sodium hydrate, then subjected to the action of steam in closed vessels. While subjected to the action of the steam soda liquor is from to time introduced. After this the fabrics are washed and subjected to the action of chlorine liquor.

333,883.—Composition for preventing and removing rust. J. F. Nolan.

Consists of carbon disulphide, beeswax and sperm oil.

333,893.—Insecticide. T. W. Shugart and C. D. Clifton.

An inflammable composition, consisting of alkanet root, arsenious acid, gum camphor, iodine, phosphorous, sulphur and carbon disulphide.

333,967.—Furnace for reducing and distilling zinc from its ores. C. H. Murray. W. R.

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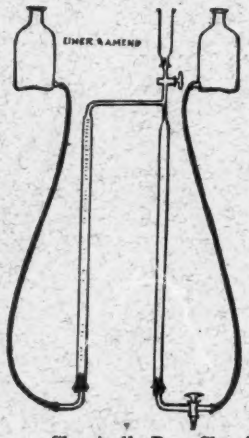

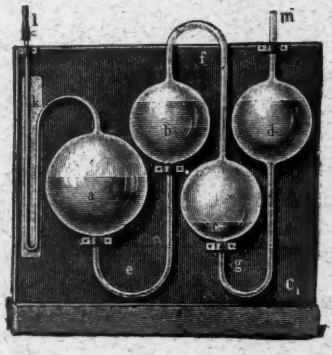

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